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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/817,361	04/02/2004	Richard I. Masel	15581US01	2569
24978 7590 04/28/2009 GREER, BURNS & CRAIN 300 S WACKER DR 25TH FLOOR CHICAGO, IL 60606				
EXAMINER				
WILLS, MONTQUE M				
ART UNIT		PAPER NUMBER		
1795				
MAIL DATE		DELIVERY MODE		
04/28/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/817,361

Applicant(s)

MASEL ET AL.

Examiner

Monique M. Wills

Art Unit

1795

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 and 51 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 and 51 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/S508)
- Paper No(s)/Mail Date 2/6/09
- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

This Office Action is responsive to the Amendment filed February 6, 2009. The rejection of claims 1, 2, 5-24 & 51 under 35 U.S.C. 103(a) as being unpatentable over Hampden-Smith et al. U.S. Pub. 2006/0292434 in view of Masel et al. U.S. Pub. 2004/0045816 is overcome. The rejection of claims 3-4 under 35 U.S.C. 103(a) as being unpatentable over Hampden-Smith et al. U.S. Pub. 2006/0292434 in view of Masel et al. U.S. Pub. 2004/0045816 and further in view of Pomeroy et al. U.S. Pat. 3,297,487 is overcome.

The pending claims are rejected as follows:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 5-24 & 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hampden-Smith et al. U.S. Pub. 2006/0292434 in view of Ha et al. J. of Power Sources 112 (2002) 655-659.

With respect to claim 1, Hampden-Smith teaches a fuel cell comprising: an anode to which said fluid fuel is directed, said anode having an electrocatalyst associated therewith, said electrocatalyst comprising palladium nanoparticles; a cathode to which said fluid oxidant is directed, said cathode electrically connected to said anode; and an electrolyte interposed between said anode and said cathode. See Paragraphs 6 & 102. With respect to claims 5 & 6. the electrolyte is an ion exchange membrane such as a proton exchange membrane. See paragraphs 6 & 93. With respect to claim 7, the proton exchange membrane comprises a perfluorosulfonic acid ionomer (par. 93). With respect to claim 8, it would be reasonable to expect the ion exchange membrane to be substantially impermeable to the fuel stream, because Hampden-Smith teaches the same membrane as set forth by Applicant. Support for this assertion is provided in MPEP 2112.01, "[where] [p]roducts of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, since Hampden-Smith teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. See *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). With respect to claim 9, the electrolyte includes acid electrolytes (par. 93). With respect to claims 10-12, the palladium catalyst nanoparticles have a diameter of 1 to 10 nm. See paragraph 102. With respect to claim 51, the electrocatalyst is palladium nanoparticles (See par. 102). With respect to claims 13-15, the surface area is 10 to 25 m²/g. See paragraph 130.

Hampden-Smith does not expressly disclose: formic acid fuel (claim 1); at least 3M formic acid (claim 2); 25% to 65% formic acid (claims 16-20); cell is capable of generating a power density of at least $150\text{mW}/\text{cm}^2$ (claims 21-22); cell is capable of generating open circuit voltage of at least 0.8 V (claim 23) or wherein the catalyst is configured to promote reaction of said formic acid via a direct path that diminished formation of a CO intermediate (claim 24).

Ha teaches that it is well known in the art to fuel cell with formic acid and methanol, wherein the formic acid is 9M. The use of 9 M formic acid and methanol can increase the current at 60 degrees from 95 to 320 mA/cm^2 at 0.3V. The maximum power density increases from 33 to 119 mW/cm^2 . The cell resistance decreases from 0,37 to 0,32 cm^2 . See the abstract, page 655-656.

Therefore, it would have been obvious to one of ordinary skill in the art in the time the instant invention was made to employ a fuel cell comprising formic acid as taught by Ha, in the fuel cell of Hampden-Smith, in order to increase maximum power density, increase current and decrease cell resistance.

With respect to claims 16-20, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the formic acid concentration of 25% to 65% , since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The skilled artisan recognizes that the concentration of fuel directly effects utilization of the catalyst material.

With respect to claims 21-22, it would have been reasonable to expect the fuel cell of Hampden-Smith in view of Ha to generate an open circuit voltage of at least 0.8 V, since the cell is made from the same material as the instant claims. Support for this assertion is provided in MPEP 2112.01, "[where] [p]roducts of identical chemical composition can not have mutually exclusive properties. "A chemical composition and its properties are inseparable. Therefore, since Hampden-Smith teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. See *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

With respect to claims 23, it would have been reasonable to expect the cell of Hampden-Smith in view of Ha be capable of generating an open circuit voltage of at least about 0.8V, since the cell is made from the same material as the instant claims. Support for this assertion is provided in MPEP 2112.01, "[where] [p]roducts of identical chemical composition can not have mutually exclusive properties. "A chemical composition and its properties are inseparable. Therefore, since Hampden-Smith teaches the identical cell structure, the properties applicant discloses and/or claims are necessarily present. See *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir.1990).

With respect to claims 24, it would have been reasonable to expect the catalyst of Hampden-Smith in view of Ha to promote reaction of said formic acid via a direct path that diminished formation of a CO intermediate, since the cell is made from the same material as the instant claims. Support for this assertion is provided in MPEP

2112.01, "[where] [p]roducts of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, since Hampden-Smith teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. See *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hampden-Smith et al. U.S. Pub. 2006/0292434 in view of Ha et al. J. of Power Sources 112 (2002) 655-659 and further in view of Pomeroy et al. U.S. Pat. 3,297,487.

Hampden-Smith in view of Ha teach a fuel cell as described in the rejection recited hereinabove.

However, the reference does not expressly disclose anode/cathode enclosures.

Pomeroy teaches that it is well known to employ anode/cathode enclosures in polymer electrolyte fuel cells.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the anode/cathode enclosures of

Pomeroy in the fuel cells of Hamden-Smith, in order to increase fuel/oxidant exposure to the electrodes.

Response to Arguments

Applicant's arguments with respect to claims 1, 2, 5-24 & 51 have been considered and are persuasive. The previous pending rejections are withdrawn.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Monique Wills whose telephone number is (571) 272-1309. The Examiner can normally be reached on Monday-Friday from 8:30am to 5:00 pm.

If attempts to reach Examiner by telephone are unsuccessful, the Examiner's supervisor, Patrick Ryan, may be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Monique M Wills/

Examiner, Art Unit 1795

/PATRICK RYAN/

Supervisory Patent Examiner, Art Unit 1795